



Moisture Problems in Crawlspace and Basements

Damp or wet crawlspaces and basements is one of the most potentially damaging items we frequently encounter in an inspection. Several areas in the Missoula and Bitterroot valleys are especially prone to problems, but excess moisture can be found in any home. Sometimes it will be obvious, such as standing water in a crawlspace dirt floor or basement. Symptoms we look for during an inspection include:

- it feels damp or smells musty
- sweat or condensation on walls or water supply pipes
- presence of moisture loving insects
- discoloration, staining, dark spotting
- peeling, blistering, cracking paint
- crusty or powdery white salt deposits on walls or ground
- deformed or swollen wood surfaces
- mildew, mold, or wood decay and wood rot

Wet conditions encourage mold, fungi and rot that can warp or damage wood floor joists and girders to the point of failure; some molds may cause allergic reactions and occasionally serious illness; settlement can be accelerated; unwanted insects are attracted to the moisture; and more.



It is important to note that moisture may only be seasonal, and may not show up every year. However, it should not be ignored, because repeated cycles of dampness will eventually lead to mildew and mold that will damage the structure and may also cause health problems for the occupants. Finding a problem, and then properly addressing the issue can be used as a positive selling point in real estate transactions.

Causes

Some problems are a result of bad geography, or bad geology. A home may have been too close to a river, stream, or irrigation ditch, may have poor grading that causes rain to flow toward the structure (negative grade), be downhill from someone else's irrigation, or have an architectural or landscape feature that invites water. Clay soils don't drain well and can cause a house to settle unevenly. In a perfect world, the best moisture solutions would have been included as part of the original construction. Severe problems that show up after the house is complete may require changes in landscaping, excavation around a foundation, and adding drainage systems.



Solutions

There are several methods to mitigate moisture in crawlspaces, some of which are relatively simple and inexpensive. Of course every home is different; there is no one cure-all that is the miracle answer to all situations.

Keep Water Away from the Home

- Look at the landscaping. Does the yard slope toward the house? Patios and sidewalks should slope away from the house, not toward it. Look under decks for depressions that allow drainage to pond up against the foundation.
- Are there a lot of thirsty plants around the house? Flower beds, shrubs, and trees tend to hold moisture in the soil around the house.
- Irrigation and sprinkler systems. Over-watering the lawn and irrigating plants immediately around the house can introduce a lot of water around the foundation. Problems show up when irrigation water is added to ground that is already saturated from rain, melting snow, and high water tables.
- Look at the roof. Sometimes most of the moisture is concentrated in one area of the crawlspace or basement. Does the roof design tend to funnel runoff down valleys and collect at some areas around the house?
- Gutters. Gutters. Gutters. And gutter extensions. Direct runoff away from the foundation. This can often be the easiest and best solution.

Good detective work in a home inspection article, "[Sometimes the cause of a wet basement or crawlspace may not be what you expect](#)"

Contain and Manage Moisture

- Check the foundation for cracks and holes. Seal and patch any cracks as well as openings around any sewer pipes or water supply lines that go through the foundation walls.
- Moisture barriers in crawlspaces. Make sure the sheets of plastic are taped at the seams, wrapped and sealed around columns, and then bring the plastic at least 6 inches up the foundation wall. Contractors sometimes use special 20 mil moisture barriers as a more permanent solution.
- Cover the foundation walls with rigid foam panels or spray-on foam moisture-proof insulation. This not only insulates the walls and saves energy dollars, but also keeps rising dampness in the concrete from getting into the crawlspace or basement. Be sure to insulate and caulk the rim joists. *The rim joist is usually the first place to find mildew and mold due to condensation.*
- Are there any other issues in the home that contribute to moisture in the crawlspace or basement? Dryer vents. Plumbing leaks (check tub drains and shower pans). Are there sources of humidity in other parts of the house that contribute to a generally damp environment (fish tanks, humidifiers, poor venting of bathrooms, poorly sealed windows or walls, etc.)? This may require some detective work.
- Add interior or exterior drainage. Significant and chronic moisture problems may require exterior excavation around part of all of the foundation, or digging drainage ditches inside the crawlspace or basement floor. To provide a permanent solution that works properly, a contractor is usually needed.

A good source for more reading, "[Dirt Crawlspaces Information Center](#)"

Get Rid of Moisture

Sump pumps

Ok, so there is enough standing water that needs to be pumped. But once the initial wet season is temporarily taken care of, go back and install it correctly. Make sure the sump pit is deep enough to collect ground water. Dig trenches and lay down French drains in crawlspaces or drainage tiles in basements to allow the sump pump to do its job. Get electrical service and drain lines properly installed. Preferably, cap and cover the sump pit so you don't leave an open barrel of standing water for bacteria to collect and act as a source of humidity for the house.

Ventilation

It is probably the most important solution, and often done wrong. Proper ventilation is needed to remove excess humidity from damp floors and leaky foundations. What seems to work in the summer often does not work in the winter. The humidity in damp air condenses onto cool or cold surfaces as the temperature drops. Poor ventilation leads to condensation, which leads to mildew and wood rot. For crawlspace or basement areas that are occasionally damp consider a dehumidifier to prevent mildew and mold growth. Venting is a complex topic that can't be completely covered here. Don't hesitate to call in a professional for a thorough review of your particular situation, you may save money and avoid creating problems in the long run.

There are two different types of crawlspace designs, vented and non-vented.

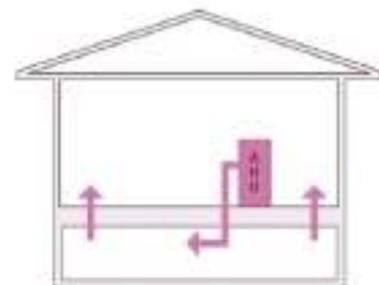
Vented Crawlspace:

Traditional design for a crawlspace includes vents that should provide cross ventilation (1 sq ft vent for every 150 sq ft of crawlspace floor without a moisture barrier), and typically the crawlspace vents are closed for the winter. Recent standards require a moisture barrier on dirt crawlspace floors, and insulation on the underside of the sub floor. This creates a cold crawlspace. Heating ducts should be insulated to keep condensation from forming inside the heat ducts and for energy conservation. With less heat leaking from the house, water supply pipes have to be protected from freezing; a heater or heat tape may be needed to prevent frozen pipes.

Traditional crawlspace vents often allow humid or damp outside air into a cool crawlspace that actually increase the levels of moisture. When our inspection indicates a long-standing moisture problem, the best advice may be to stop venting the crawlspace and to convert it to a dry, conditioned space.

Non-vented (conditioned) Crawlspace:

No vents are present in the foundation wall. A vapor barrier is still required. The crawlspace foundation walls are insulated; the sub-floor is not. The space can't be completely sealed; ventilation is still needed to allow circulation of air to prevent accumulation of humidity. A fan to depressurize the crawlspace can be used in some cases. It is termed a 'conditioned' crawlspace because air from within the house is usually circulated in and out of the crawl. One example, a heat supply register and return vent move a small amount of household air through the crawlspace. When done properly, a closed crawlspace is more energy efficient than a vented crawlspace since plumbing and HVAC ducts are in an insulated environment.



A: Supply air to crawlspace

- Minimum 2-4"x8" transfer grilles to house
- 20 cfm of flow per 1,000ft² of crawlspace
- Air handler cycled at 5 minutes per hour

Special considerations must be given to gas heating and hot water systems; no traditional crawlspace vents are present to provide combustion air. Direct-vent high efficiency furnaces are allowed; conventional gas hot water heaters must be relocated (or use electric water heaters). I should note that many builders do not completely conform to building code, and use a hybrid design of vented and non-vented crawlspaces; when done intelligently and other steps have been taken to keep moisture away from the house, it seems to work ok.

For more reading about conditioned crawlspaces, go to Building Science.com

A side note on insulation

Though inexpensive in the short run, fiberglass insulation that is normally used inside walls or in the attic never works well in the long run when used on the underside of crawlspace sub floors or on walls. It *always* falls down. When it does get damp, it is worthless; the paper vapor barrier is great food for mildew and mold. And, it makes a great home for insects and rodents.

A good home inspector can usually be very helpful in identifying and suggesting solutions. Call us if you have any questions or concerns about moisture problems in your crawlspace or basement.

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